STAFF REPORT

PROPOSED STORMWATER SOURCE CONTROL MEASURES

FOR THE

EVRAZ OREGON STEEL MILLS SITE
PORTLAND, OREGON

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1. INTRODUCTION

1.1 INTRODUCTION

This document presents the proposed source control measures for stormwater at the Evraz Oregon Steel (EOS) facility located at 14400 Rivergate Avenue, Portland, Oregon. The proposed measures address contaminants associated with upland soils and facilities that are entrained in stormwater runoff and transported to the Lower Willamette River. Separate proposals are also being developed to address erosion of contaminated bank soils and contaminated groundwater migration from the EOS facility.

The site location is shown in Figure 1. This proposal was developed in accordance with the Portland Harbor Joint Source Control Strategy (December 2005).

The proposed source control measure is based on the administrative record for this site. A copy of the Administrative Record Index is included in Section 10. This report summarizes the more detailed information contained in the Remedial Investigation (RI), and Source Control Evaluation reports pertinent to this action that were completed by EOS under a Voluntary Agreement with the Oregon Department of Environmental Quality (DEQ) (2000).

1.2 SCOPE AND ROLE OF THE PROPOSED SOURCE CONTROL ACTION

The proposed source control action addresses contaminated soil entrained in stormwater runoff. Metals, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) are present in site soils and have been detected in catch basin solids at concentrations exceeding Portland Harbor Joint Source Control Strategy screening level values (SLVs) for river sediment. Elevated concentrations of PCBs and metals have also been detected in sediment adjacent to the site.

The proposed source control action consists of the following elements:

- Removal of localized areas of contaminated soil.
- Paving areas where feasible.
- Best management practices implementation.
- End-of-pipe treatment for the majority of stormwater leaving the facility.

Over the past four years, the EOS facility has undergone major site renovations. As part of the renovation process, EOS did a number of things to address stormwater and other source control concerns, including removing contaminated surface soil, paving areas and implementing additional stormwater best management practices. Under a pilot study work plan, EOS has constructed an end-of-pipe treatment system for the majority of site stormwater discharge. These actions were completed based on the stormwater source control evaluation report and are being evaluated for consistency with the stormwater discharge permit and associated stormwater pollution control plan. DEQ has reviewed the work completed and required additional testing to demonstrate effective source control. The evaluations completed and the status of the stormwater source control measures are summarized in this document.

2. SITE HISTORY AND DESCRIPTION

2.1 SITE LOCATION AND LAND USE

The EOS site is situated on the eastern bank of the Willamette River in the Rivergate industrial area of Portland, Oregon (Figure 1). The property consists of approximately 145 acres, with a physical address of 14400 North Rivergate Boulevard, Portland, Oregon. The site is located at approximately River Mile 2 of the Willamette River which is part of the Portland Harbor Superfund Site Study Area.

A site plan of the facility is provided in Figure 2. The EOS site is used for manufacturing steel slabs, plates, coils, and spiral weld pipe from scrap metal (historically) and purchased steel slabs (current process). The property is surrounded by other industrial manufacturing and transfer facilities to the north, east and south. Ramsey Lake and associated wetlands are located further to the east.

2.2 PHYSICAL SETTING

2.2.1 Climate

Average annual gross precipitation for the area is approximately 40 – 45 inches/year. The majority of the precipitation falls between October and March, with July being the driest month and December the wettest.

2.2.2 Geology/Hydrogeology

The area now occupied by the EOS facility is an historic floodplain between the Willamette and Columbia Rivers and is located approximately two miles upstream of the confluence of these rivers. The native deposits at the site consist of sands, silty sands and silts generally characteristic of river floodplains. The native deposits are overlain by various types of fill including dredge fill which is similar to the native deposits, slag-soil fill, and other localized fill units ranging in composition from silty sand to slag aggregate fill.

2.3 HISTORICAL FACILITY OPERATIONS

Prior to 1942, the EOS property was vacant. The historical changes in land surfaces in this area can be followed using topographic maps and aerial photographs dating back to 1929. In 1918, an island labeled as the Post Office Bar was identified offshore of the current EOS location. A large water body, Ramsey Lake, and its adjoining wetlands occupied much of the Rivergate Area. Between 1929 and 1940 the Post Office Bar appears depositional and becomes attached to the river's edge. Filling of the Rivergate Area including the EOS property began in 1942.

During the time of Port ownership (1942 to 1967) filling continued and the Port authorized Shaver Transportation and others to operate an oil sump, called the Ramsey Lake Sump, on the property. The former sump was used for the disposal of ship bilge water and other waste oils and fluids. No known industrial activities occurred at the site between the closure of the former oil sump (1960) and construction of the steel mill, which was completed in 1969.

The property was purchased by Gilmore Steel Mills (a predecessor of EOS) from the Port of Portland in 1967. Since 1969, the facility has been used for steel production and related ancillary operations. The EOS facility includes several large industrial process buildings (combination plate rolling mill, a pipe and coating mill, cut to length facility, melt shop, surface processing and maintenance), a cooling pond, office buildings, parking lots, and material processing and staging areas (Figure 2). The melt shop was idled in May 2003 and the pipe and coating mill is currently idle due to market conditions. Currently, EOS manufactures finished steel products from steel slabs.

A shear referred to as the Mosely Shear was historically located in the southeastern corner of the EOS facility. Hydraulic oil and associated PCBs were released from this facility during the early years of its operation. In April 2006 EOS conducted a removal action in this area of soil containing free-phase hydraulic oil and PCBs at concentrations that exceeded 7.5 parts per million (ppm).

2.4 STORMWATER SYSTEM AND ASSOCIATED MIGRATION PATHWAYS

Sites adjacent to a water body typically have four primary routes through which upland sources can result in contamination of the water body: direct discharge (including that from overwater activities), erosion of soil from the shoreline areas, migration of contaminants via groundwater discharge, and release of contamination associated with stormwater discharge. The focus of this source control proposal is release of contamination associated with stormwater discharge.

All stormwater from the facility either drains by sheet flow to a system of catch basins and storm sewers or percolates into unpaved ground surfaces. The storm sewers historically conveyed runoff to three outfalls. Prior to 2009, the Central Outfall 001 and Northern Outfall 003 discharged stormwater directly to the Willamette River. Flow to these outfalls is now treated and flows through a clarification basin located on the northwestern corner of the facility prior to discharge at the Northern Outfall 003. The Central Outfall 001 now is only available for use in emergency situations when the capacity of the existing system is overwhelmed and is referred to as the Central

Emergency Outfall 001. The Rivergate Outfall 002 discharges stormwater to a City of Portland storm sewer located in N. Rivergate Boulevard. This sewer carries water south along N. Rivergate Blvd then westward at N. Ramsey Blvd and discharges into the Willamette River via City of Portland Outfall 53A. Flow to the Rivergate Outfall 002 is treated using sand filtration and bioswales prior to discharge. Some incidental stormwater also discharges (under NPDES permit #101007, File #64905) to the Willamette River as part of the plant service water effluent discharged at the waste water outfall, designated 001. Figure 3 shows the current locations, configurations, and surface areas of drainage basins on the EOS Rivergate property as determined by analysis of surface topography.

Activities that occur at the site that have exposure to stormwater occur in the three drainage basin as follows:

- Northern Outfall 003 – Combination rolling mill, coating mill, pipe mill, cut to length facility, melt shop, surface processing, and maintenance.
- Rivergate Outfall 002 – Pipe transport and pipe storage, roof runoff from pipe mill, and employee parking.
- Infiltration – Pipe transport and pipe storage and materials processing.

Media of potential concern for the stormwater discharge pathway being addressed in this document consist of contaminated surface soil that may become entrained in the stormwater as it flows across the site, contaminated groundwater that discharges through the stormwater system due to subsurface piping failures, and the stormwater itself.

2.5 CONTAMINANTS OF POTENTIAL CONCERN

The long history of industrial activity at this site has resulted in contamination of surface soil and groundwater with a variety of contaminants. The primary media of concern for the stormwater evaluation are surface soil that may be entrained in stormwater run-off, storm system sediments, and groundwater that may infiltrate the stormwater system piping.

Soil

Because the historical oil sumps were filled, soil contamination associated with this source is subsurface and unlikely to impact stormwater other than via groundwater intrusion into the stormwater system. Petroleum hydrocarbons were detected in groundwater samples in this area. Non-aqueous phase liquid was not observed in monitoring well samples collected from the top of the water column (floating product or LNAPL) within the wells or from the sump located below the screened interval in the wells (sinking product or DNAPL) prior to pumping from the well. Stormwater drainage from the majority of the former oil sump area is routed through the new stormwater treatment system prior to discharge.

Forty-eight surface soil samples (0 to 3 feet bgs) have been collected at the EOS facility since 2002.[1] PCBs, metals (arsenic, cadmium, chromium, lead, and manganese), and indeno(1,2,3-

1 This excludes soil samples collected to characterize Mosely Shear soil excavation, as detailed in Mosely Shear

cd)pyrene were detected in these surface soil samples at generally low levels but at concentrations exceeding Portland Harbor Joint Source Control Screening Levels (SLVs). The SLVs for upland soil or stormwater sediment include toxicity and bioaccumulation screening level values. A summary of the concentrations of chemicals detected in surface soil samples, and applicable SLVs, is presented in Table 1 (complete results are provided in Appendix B); sample locations are shown in Figure 4. The following bullets summarize results for chemicals detected at concentrations greater than the applicable SLV[2]:

- **PCBs:** Total PCB concentrations in twelve of the forty-eight samples collected exceeded both the bioaccumulative (0.00039 ppm) and toxicity (0.676 ppm) SLVs. Detected values ranged from 0.011 ppm to 4.48 ppm, with the exception of one reading of 430 ppm adjacent to the main electrical substation where historical releases have been documented. This area has subsequently been paved.
- **Metals**: Metals concentrations have been measured in five surface and numerous subsurface soil samples. In the five surface soil samples, copper and zinc did not exceed the SLVs. Chromium and manganese concentrations exceeded the toxicity SLVs (111 ppm and 1,100 ppm respectively) in one to three of the samples. Arsenic, cadmium, and lead concentrations exceeded the bioaccumulation SLVs (7 ppm, 1 ppm, and 17 ppm respectively) in one to two samples, but not the toxicity SLVs. Detected values ranged from 27.8 to 335 ppm for chromium, 478 to 3,090 ppm for manganese, 4.48 to 9.49 ppm for arsenic, 0.48 to 1.06 ppm for cadmium, 8.07 to 33.7 ppm for lead, and 68 to 192 ppm for zinc.
- **PAHs**: One PAH compound (indeno(1,2,3-cd)pyrene) was detected above its respective toxicity SLV of 0.1 ppm in one of the five surface soil samples analyzed for PAHs. Detected values of indeno(1,2,3-cd)pyrene ranged from 0.056 to 0.15 ppm.
- **TPH**: There are no SLVs specified for petroleum compounds. The DEQ identified a generic risk-based concentration (RBC) for diesel-range hydrocarbons of 23,000 ppm for a construction worker scenario (DEQ, 2003). The maximum detected value of diesel-range hydrocarbons in surface soil was 7,000 ppm, below the RBC value. Total petroleum hydrocarbons (TPH) residual range, were detected in all 18 samples analyzed; detected values ranged from 50.5 to 24,000 ppm.

Catch Basin Sediments

As part of the 2004 Phase I investigation, sediments were collected from 16 catch basins located throughout the facility and analyzed for metals, petroleum hydrocarbons, PCBs, and PAHs. Concentration summaries for chemicals detected in catch basin solid samples and applicable SLVs, are presented in Table 2 (complete results are provided in Appendix C); sample locations are shown in Figure 4. The following bullets summarize results for chemicals detected at concentrations greater than applicable SLVs:

- **PCBs**: Total PCB concentrations exceeded the toxicity SLV (0.676 ppm) in five of the

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Hot Spot Removal Completion Report (Retec, 2006c).

[2] The SLV screening levels are based on the protection of aquatic ecological receptors and human receptors based on consumption of fish. The PCB, metals, and PAH concentrations at the site (with the exception of the one PCB concentration of 430 ppm discussed below) are below risk-based levels for the protection of industrial workers.

sixteen locations. All detected values were above the bioaccumulative SLV (0.00039 ppm). Detected values ranged from 0.018 ppm to 2.13 ppm.

- **Metals**: The cadmium concentration exceeded both the toxicity and bioaccumulation SLVs (4.98 ppm and 1 ppm, respectively) in one location and the lead concentration (detected at up to 670 ppm) exceeded both the toxicity and bioaccumulation SLVs (128 ppm and 17 ppm, respectively) in two locations. Chromium (detected at up to 7,000 ppm), copper, manganese (detected at up to 68,000 ppm), and zinc concentrations exceeded their respective toxicity SLVs (111 ppm, 149 ppm, 1,100 ppm, and 459 ppm, respectively) in over half of the locations. Arsenic concentrations did not exceed the toxicity SLV, but exceeded the bioaccumulation SLV (7 ppm) in four locations.
- **PAHs**: Two PAH compounds (benzo(g,h,i)perylene and chrysene) were detected above their respective toxicity SLVs of 0.3 and 1.29 ppm in one location and indeno(1,2,3-cd)pyrene was detected above its toxicity SLV of 0.1 ppm in five locations. Pyrene was detected above both its toxicity and bioaccumulation SLVs of 1.52 and 1.9 ppm, respectively, in five locations.
- **TPH**: TPH was detected in all catch basin samples at concentrations ranging from 9.9 to 1500 ppm diesel range hydrocarbons and 67 to 7,900 ppm residual range hydrocarbons.

Groundwater

Groundwater is known to infiltrate the stormwater pipes in the Outfall 001 basin, as is evidenced by the presence of dry weather flow in the pipes. In 2002, dry weather flow discharging from Outfall 001 was sampled to evaluate whether contaminated groundwater is infiltrating into the stormwater system and needed to be taken into consideration in the design and evaluation of the new treatment system. These samples contained concentrations of manganese that exceeded the SLV (Exponent, 2004a). Manganese concentrations (up to 2,100 ppb; SLV of 50 ppb – based on the National Secondary Drinking Water Standard[3]) appeared to be consistent with background concentrations measured at monitoring wells installed on the eastern property boundary of the site and concentrations detected regionally in the Columbia Slough Watershed (Parsons, 2007). Consequently, it was concluded that groundwater infiltration was not having an adverse impact on stormwater discharging at the Central Emergency Outfall 001. This flow is now directed through the new stormwater treatment system.

At two locations on the site (referred to as Area U, (station W-2), an electrical vault on the south side of the rolling mill; and Area V, (station W-3), a subsurface vault at the east end of the shipping bay), groundwater that collects in subsurface vaults is pumped to the stormwater system (Figure 4). Water samples were collected from these locations to evaluate if they are contributing contaminants to the stormwater system that discharges to the Northern Outfall (003)(Exponent, 2004a). The sample collected from Area U on March 21, 2003 contained no organic compounds, and metals were detected at concentrations consistent with naturally occurring levels. The sample collected from Area V on October 18, 2002 contained metals at elevated concentrations; however, the sample was very turbid and filtered analyses indicated dissolved metals were below levels of concern. Petroleum hydrocarbons and some volatile organic compounds were also detected. PAHs and

[3] National Secondary Drinking Water Regulations are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply.

PCBs were not analyzed for due to limited sample volume. This groundwater is now directed through the new stormwater treatment system prior to discharge.

3. REGULATORY HISTORY

EOS is authorized to discharge stormwater under a 1200Z General Stormwater Discharge Permit. The permit requires them to develop and implement a Stormwater Pollution Control Plan (Appendix A) which describes the best management practices (BMPs), spill prevention and response procedures, preventative maintenance, employee education and monitoring practices they implement at the site.

From 1997 until 2007, EOS sampled effluent from each of its three outfalls two times per year and analyzed it for pH, total suspended solids (TSS), oil and grease (O&G), copper, lead, and zinc. In 2007, under its new 1200Z permit, EOS began sampling for the same parameters four times per year. In 2009, when Central Outfall 001 was diverted to the treatment pond, sampling at Central Outfall 001 ceased. Sampling results indicated periodic exceedences of TSS and copper benchmarks prior to the addition of stormwater treatment in 2007. With the exception of two benchmark exceedances of TSS related to optimization testing of the new treatment system, sampling results have been below benchmarks since the first phase of the stormwater treatment system was operational in May 2007. DEQ is currently in the process of determining if the new stormwater treatment system installed at the site to address stormwater that previously discharged through OFs 001 and 003 will require an individual stormwater permit.

The facility also operates a service water treatment system consisting of a cooling pond, a bank of sand filters, and a storage tank. Water, primarily from the Willamette River (surface water withdrawal Permit No. S37537), is circulated within the plant for contact and non-contact cooling. The service water is re-circulated to the extent possible prior to entering the service water treatment system and ultimately discharged to the Willamette River under an NPDES permit (Permit No. 101007, File No. 64905), through the waste water outfall 001 (Figure 3).

EOS has two closed landfills on site referred to as the East and West Landfills. The West Landfill (SWD Permit No. 1174) was closed in 1995 and the landfill permit terminated in 1997. DEQ approved reconfiguration of the landfill to accommodate a rail line in 2005. The East Landfill was closed in 2001 and the permit (No. 2612) terminated in 2002. In 2005, DEQ granted a Solid Waste Letter of Authorization (SW LA No.1326) to OES to allow them to reconfigure the East landfill to accommodate the rail line and to add contaminated soil generated as a result of construction activities to the landfill.

EOS is currently working with DEQ to complete source control activities at the Site under the June 2000 Voluntary Remedial Investigation Source Control Measures Agreement (Voluntary Agreement) between DEQ and EOS (DEQ, 2000). EOS has conducted site-wide remedial investigation activities since entering into the Voluntary Agreement including records review, mapping, surface and subsurface soil sampling, monitoring well installation, groundwater sampling, risk assessment and feasibility evaluations.

4. HAZARDOUS SUBSTANCE RELEASES

As indicated in section 2.5, the long history of filling and industrial activity at this site has lead to releases of hazardous substances to soil. These substances have sorbed to the surface soil particles and some of these particles become entrained in stormwater which ultimately exits the facility. As identified in the *Phase I Remedial Investigation Report* (Exponent, March 2004a), site chemicals of interest include metals, diesel- and residual-range hydrocarbons, PAHs, and PCBs. As shown in Table 2, maximum detected concentration of metals, PCBs, and certain PAHs (benzo(g,h,i)perylene, chrysene, indeno(1,2,3-cd)pyrene, and pyrene) exceeded SLVs in catch basin solids. Diesel and residual-range hydrocarbons were also detected but there are no SLVs for these compounds.

5. SOURCE CONTROL EVALUATION

5.1 NATURE AND EXTENT OF CONTAMINATION

Catch basin data indicate the presence of metals, PCBs, and certain PAHs at concentrations exceeding SLVs throughout the facility. These data appear to correlate with stormwater solids data collected from the Central Emergency Outfall 001 by the Lower Willamette Group as part of the Portland Harbor remedial investigation in 2007 (Anchor & Integral, 2008). See Table 2 for a summary of the data. The catch basin data and a general understanding of site activities suggest that sources of contamination at the facility are diffuse and with contaminant concentrations that are moderately elevated. The contaminants of concern for this pathway have low solubility and tend to adhere to soil particles.

5.2 PRIORITY FOR SOURCE CONTROL

The stormwater pathway was determined to be a high priority for source control based on exceedances of SLVs in catch basin samples, stormwater samples, and stormwater solids.

5.3 FACTORS CONSIDERED IN DEVELOPING SOURCE CONTROL OPTIONS

The following factors were considered in evaluating the adequacy of the existing data for supporting an interim source control action for stormwater at the EOS site:

1. The data indicate that the primary source of contamination to stormwater at this site is upland soil contamination resulting from historical industrial and filling activities.
2. Except for isolated areas, metal and PCB impacts in soil are diffuse as opposed to concentrated in identifiable deposits that are amenable to focused removal or other remedial actions.
3. Paving all areas that drain to the storm system is not feasible due to the extreme weight of loads transported throughout the facility.
4. Dry weather storm drain flows and drain inspections indicate that groundwater infiltration occurs within portions of the storm drain system and the engineering required to isolate the system from groundwater infiltration was found to be very difficult due to accessibility of the impacted piping.

Based on these factors source control options for stormwater at the EOS facility focused on reducing solids loading from each drainage basin through implementation of best management practices and installation of a stormwater treatment system.

6. PEER REVIEW SUMMARY

Technical documents produced during the investigation and source control evaluation and documentation of implemented stormwater treatment facilities for EOS stormwater have been reviewed by a technical team at DEQ. The team consists of the project manager, the cleanup program stormwater coordinator, a toxicologist, and an engineer. The team supports the proposed source control action.

7. SOURCE CONTROL OPTIONS

7.1 SOURCE CONTROL OBJECTIVES

The source control objectives for stormwater at the EOS site are:

- Reduce the amount of solids and associated contaminants entrained in stormwater runoff from the EOS facility.

- Reduce contaminant concentrations in stormwater to levels protective of aquatic life and fish consumption exposures.

7.2 AREA TO BE ADDRESSED

All onsite areas exposed to stormwater runoff are addressed by this action. This essentially encompasses the entire facility east of the berm along the riverbank with the exception of areas that directly infiltrate and those areas that drain to the industrial cooling pond (covered under EOS's individual NPDES discharge permit). The shoreline area between the berm and the Willamette River is addressed in a separate source control evaluation.

7.3 SOURCE CONTROL OPTIONS CONSIDERED AND IMPLEMENTED

Several response action technologies were considered in developing the proposed approach for stormwater control. Generally, remedial options for stormwater include: treating or removing contaminant sources, preventing exposure of contaminants to stormwater, reducing stormwater runoff, and treating stormwater at the end of the pipe prior to discharge. Because of the large area and on-going industrial activity at this site, and considering the factors outlined in Section 5.3, elements of all of these options have been integrated into the stormwater source control proposal developed for the EOS site, the most significant element being end-of-pipe treatment, as described in the following sections.

Since preparation of the Stormwater Source Control Evaluation in 2006, EOS has implemented several of these remedial options as interim actions and best management practices.

7.3.1 Removal/Treatment

Surface soil throughout the EOS facility has been found to contain COCs at concentrations that exceed SLVs for stormwater. Removal actions have been completed at the areas shown on Figure 5 to address more concentrated zones of contamination:

1. **Soil Pile Removal.** A large soil pile generated as a result of construction work on site (soil pile #1) (approximately 62,000 cubic yards; RETEC 2007b) was removed from the northern portion of the facility. The soil pile had elevated concentration of PCBs, diesel and residual range petroleum hydrocarbons, and metals (copper, lead, nickel, and zinc). This soil was placed in the onsite landfill during its reconstruction in late 2005 and early 2006. The DEQ permitted landfill is capped and the soil is no longer a potential source to stormwater.
2. **Surface Soil Removal.** Additional surface soil was excavated from north of the rolling mill and scrap yard areas and consolidated into two piles (soil piles #2 and #3) with a total approximate volume of 21,000 cubic yards; (RETEC 2007b). The soil had elevated concentrations of PCBs, diesel and residual range petroleum hydrocarbons, and selected metals. This soil was placed in the east landfill during its reconstruction in late 2005 and early 2006. The DEQ permitted landfill is capped and the soil is no longer a potential source to stormwater.
3. **Spiral Pipe Mill Construction.** Approximately 3,000 cubic yards of hydrocarbon-impacted soil were generated during the construction of the pipe mill facility. This soil was disposed of in the east landfill during its reconstruction in late 2005 and early 2006. The DEQ permitted landfill is capped and the soil is no longer a potential source to stormwater.
4. **Mosely Shear Interim Action**. Surface and subsurface soil from the former location of the Mosely Shear was considered a hot spot due to potentially mobile nonaqueous phase liquid (NAPL). Approximately 850 to 900 cubic yards of soil were removed from this area in 2006 as part of an interim action prior to renovation. The surface and subsurface soil contained PCB and diesel and residual range hydrocarbon contamination above screening levels. The soil was disposed of off-site and is no longer a potential source to stormwater (RETEC 2006c).
5. **North Fence Soil Removal.** Approximately 240 cubic yards of petroleum-contaminated soil were removed in 1997 following the cleanup of a spill from an above ground tank. The soil was sent off-site for incineration. An additional 120 tons of soil were removed in 1996 when an underground storage tank was decommissioned. DEQ provided a no further action letter for both removals on January 5, 2005. The site is no longer a potential source of contamination to stormwater.
6. **Coating Mill Soil Removal.** Surface and subsurface soil was removed from the footprint of the coating mill during plant renovation. Approximately 1,800 cubic yards of PCB and petroleum hydrocarbon-impacted soil were removed during the summer of 2006 and disposed of off-site.

7.3.2 Preventing Contact

The primary method for preventing contact between stormwater runoff and contaminated soil is capping areas of soil contamination. Surface soils can be capped and removed from contact with stormwater by paving and construction of large buildings. As discussed above, widespread paving of the EOS facility is not feasible due to the extreme weight of loads transported throughout the facility. However, several areas of the plant have been capped as part of plant renovation in mid-2000. The pipe mill and coating mill were constructed over large areas of the southern portion of the EOS facility. Paving was completed in ancillary areas to these buildings, in portions of the pipe storage area, and in the employee parking area and access road. Figure 2 shows the current site configuration at the EOS facility including buildings and areas that are paved.

The area immediately adjacent to the main substation, including sample location S-2 with elevated PCB concentrations, was paved in 2009. The substation is currently energized to support mill operations and features a fence and a lined secondary containment system. It is likely that PCB contaminated soil remains within the fenced substation under the lined secondary containment area but removal of all contaminated soils is not feasible at this time due to the substation's active role in powering the main plant. The source control evaluation originally considered a soil removal in the vicinity of sample S-2; however, the limited amount of soil, the recently installed asphalt cap outside the fence, and lined containment system inside the fence provide sufficient assurance that the substation area is not a pathway for entrainment of contaminants in stormwater.

The source control evaluation for stormwater identified other portions of the facility where paving could be considered to prevent stormwater contact, especially in heavy traffic areas where the potential for entrainment of solids in stormwater is higher. Paving has been considered and deemed not necessary as these areas are within the drainage basins being addressed through end-of-pipe treatment or best management practices.

7.3.3 Reducing Stormwater Flow

There are a multitude of best management practices (BMPs) that can be utilized to reduce stormwater flow from a facility, including a variety of detention and infiltration facilities. Most require space and access to install and maintain the facilities which is limited in many areas at the EOS facility due to existing plant infrastructure and on-going industrial activities. However, EOS has implemented several BMPs as shown in Figure 2 and described below:

1. **Sand Filter and Bioswales**. All stormwater runoff which drains to the Rivergate Outfall (002), with the exception of pipe mill roof runoff, passes through a sand filter or bioswale, both constructed in 2007 as part of the construction of the new pipe mill. Bioswales were constructed in 2007 between parking rows in the employee parking area, which drains to the Rivergate Outfall 002.
2. **Infiltration**. The eastern portion of the pipe transport and storage area and slab storage area were re-graded and configured with bioswales in 2007 to infiltrate stormwater runoff.

3. **In-Ground Passive Treatment System**. A Vortechnics treatment system was installed in 2000 upstream of the Northern Stormwater Pump Station. This system uses hydrodynamics and filters to remove particles from the stormwater flow. A Vortechnics/Stormfilter treatment chain was installed in 2006 during the Pipe Mill construction immediately west of the Pipe Mill. Stormwater discharge from both treatment systems drains to Northern Outfall 003.

The source control evaluation also considered implementation of additional best management practices in the basin that drains to the Northern Outfall 003 including storm drain repairs to reduce groundwater infiltration, decommissioning catch basins in unpaved areas, and grading near manholes to minimize surface water intrusion. These repairs and upgrades were problematic. The broken storm drain line where the majority of the groundwater infiltration occurs could not feasibly be repaired due to inaccessibility. The damaged drain is located at depth between two large structures in an area where steel slabs are continuously stored and transferred. Continued operations in this slab storage area are integral to plant operation. Decommissioning catch basins, grading near manholes, and other BMP retrofits were problematic due to the complexity of the built environment, and the operational impacts associated with access and BMP inspection/maintenance challenges. As discussed in Section 7.3.4, the groundwater infiltration and stormwater drainage associated with these areas are more effectively addressed through an end-of-pipe treatment system.

7.3.4 End of Pipe Treatment

Because of limitations imposed by the presence of operating industrial infrastructure, the pervasiveness of moderately elevated contaminant levels in soil throughout the facility, and the nature of the industrial activities which prevent implementation of certain stormwater controls (e.g., paving), end of pipe treatment was determined to be the appropriate stormwater management and treatment strategy for large areas of the EOS facility. The end of pipe treatment is in addition to the source management activities described above. Stormwater that previously discharged to the Central Emergency Outfall 001 and Northern Outfall 003 has been redirected to a stormwater clarification basin where, with the addition of a flocculant and reduced water flow rates, solids settle prior to discharge at the Northern Outfall 003 (Figure 6). Pilot testing conducted on the system from 2007 to 2009 indicated significant reductions in TSS and associated contaminants. Prior to the end-of-pipe treatment system, TSS averaged 200 ppm (2001 to 2006) while during the final pilot study, TSS averaged 32 ppm (AECOM 2009a). A loading evaluation of the stormwater discharge is currently underway.

8. EVALUATION OF SOURCE CONTROL OPTIONS

8.1 EVALUATION CRITERIA

The feasibility of source control options was evaluated in the *Source Control Evaluation Report* (RETEC, 2006). Protectiveness of the approach is reviewed based on the standards set forth in OAR 340-122-0040 and consistency with the Portland Harbor Joint Source Control Strategy, and options were assessed using the following remedial factors set forth and defined in OAR 340-122-0090(3):

- Effectiveness in achieving protection.
- Long-term reliability.
- Implementability.
- Implementation Risk.
- Reasonableness of Cost.

In addition, there is a preference for treatment or removal of "hot spots" of contamination as defined in OAR 340-122-0115(32) and OAR 340-122-0090(4).

The alternative evaluation for stormwater source control is unique in that there typically are not discrete, unique options that can be compared to each other. Instead, appropriate techniques are identified and integrated into a comprehensive approach considering the evaluation criteria listed above.

8.2 EVALUATION OF ALTERNATIVES

This section evaluates the source control measures appropriate for the EOS facility based on the factors described in Section 8.1.

8.2.1 Effectiveness in achieving protection

Removal and capping of selected areas effectively removes the associated contaminated soil from the stormwater discharge pathway. Implementation of BMPs, reducing stormwater runoff to the extent practicable, and finally, directing the majority of facility stormwater runoff to end-of-pipe treatment is expected to be effective in minimizing the potential for contaminant migration to the river via stormwater discharge. The contaminants of concern at the EOS facility sorb strongly to soil and are present in stormwater primarily via entrainment of contaminated soil particles. The BMPs and end-of-pipe treatment are expected to substantially reduce the amount of solids in the stormwater that discharges to the Willamette River and correspondingly reduce the pollutant load.

8.2.2 Long-term reliability

The combination of stormwater management techniques developed for the EOS facility is expected to be reliable over the long-term. However, it is recognized that reliability is dependent on maintenance of BMPs and the settling pond. Regular maintenance of BMPs, including filtration trenches, swales, and catch basin filters, is generally required to maintain effectiveness. The end-of-pipe treatment system, pumps, and treatment chemical supplies must be maintained and the clarification basin will require periodic dredging and appropriate disposal of accumulated solids. Long-term operating and maintenance procedures will be documented in OES's stormwater pollution control plan required by and enforceable under OES's NPDES stormwater permit.

8.2.3 Implementability

The structural BMPs have been implemented, generally as part of new construction projects. Redirecting the majority of stormwater flow at the site to the settling pond involved substantial construction impacts due to the need to install large pumps and modify piping infrastructure. However, the technology involved is standard and readily attainable. Administrative implementability associated with permitting is being addressed through coordination with DEQ's Water Quality program. As indicated in Appendix A, all actions described in this proposal are documented in EOS's Stormwater Pollution Control Plan submitted under their 1200Z General Stormwater Discharge Permit.

8.2.4 Implementation risk

Implementation risk primarily stems from construction hazards associated with construction and operation of large equipment and excavations.

8.2.5 Reasonableness of cost

The approximate cost for all stormwater source control activities is $3.5 million. This includes stormwater source control related studies, development of the pilot study, and design, permitting and construction of stormwater BMPs and the end-of-pipe treatment system. Ongoing operation and maintenance costs are expected to be on the order of $60,000 per year. These costs are considered reasonable for achieving the desired reduction in release of contaminants to the Willamette River.

8.2.6 Hot Spots

It is difficult to define hot spots based on impacts associated with discharge of contaminated stormwater since the impact of the discharge on the receiving body is complicated by the need to model how those contaminants are deposited and accumulate in the river and biological receptors. As documented in Section 7.3, several removals have been conducted at the site to address contamination that was highly concentrated or mobile. These actions and the implementation of end-of-pipe treatment for the majority of facility stormwater are considered to meet the criteria of treating or removing site hot spots for the purposes of the stormwater evaluation.

9. PROPOSED SOURCE CONTROL ACTION

9.1 PROPOSED ACTION

DEQ proposes a combination of BMPs and end-of-pipe treatment to control contaminant releases via stormwater at the EOS facility.

9.2 DESCRIPTION OF PROPOSED ACTION

As discussed in Section 7, certain structural best management practices were implemented in the context of the construction of the new spiral pipe mill (installing sand filter, constructing bioswales and regrading to promote infiltration). All are described in the attached stormwater pollution control plan (Appendix A) prepared by EOS as required under their stormwater NPDES Permit. These BMPs are the primary method for addressing stormwater source control in the stormwater basin that drains to the Rivergate Outfall 002

In addition to those BMPs, EOS completed soil removal and capping/containment actions, as described in Section 7, to prevent contact of stormwater with contaminated soils in certain areas.

Finally, an end-of-pipe treatment system has been installed up the pipe from the Northern Outfall 003 to collect and treat stormwater runoff from areas of the facility that previously drained to the Central 001 and Northern 003 Outfalls. Stormwater accumulates in two pump station wet wells located at the end of the southern and northern site drainage basins (see Figure 6). This activates submersible stormwater pumps which send the water to the stormwater treatment system. The Central and Northern Pump Stations deliver stormwater to the north end of the clarification basin at a constant rate. Chemical metering pumps activate simultaneously and inject chemical coagulant into the stormwater as it passes through the system. The coagulant and stormwater combine in the delivery pipe between the injection point and the point at which the amended stormwater discharges to the north end of the clarification basin.

The treatment system consists of the following steps:

1. Following passage through stormwater drainage pipes, stormwater will enter lift stations (wet wells) equipped with a level-controlled duplex pump system.

2. From the lift stations the stormwater is pumped into a 42-inch line carrying stormwater to the stormwater clarification basin. Just beyond each lift station, treatment chemical is injected into the stormwater flow to encourage particulate coagulation and flocculation. Operation of the chemical metering pumps coincides with operation of the lift station pumps. The treatment chemical mixes and reacts

with the stormwater in the length of pipe between the injection point and discharge to the stormwater clarification basin.

3. Water level in the stormwater clarification basin is controlled to a maximum elevation of 29 feet at the southern outlet point yielding an average operating depth of approximately 3.5 feet, an adequate depth for clarification purposes. Within the basin, water “snakes” around three ecology-block baffles (flowing generally north to south). Flocculated solids settle out primarily at the north end of the basin. The clarified water enters an outfall structure at the south end of the basin and flows back to the main stem of the existing storm drain that discharges to the Northern Outfall 003.

The stormwater clarification basin consists of three partitioned sections of an earthen basin which discharges to Willamette River through Northern Outfall 003. The current configuration is designed to retain and treat stormwater up to a 100-year storm event. Maximum flow estimated for a 100-year event is approximately 24,000 gallons per minute (gpm). Considering there are two pumps at each lift station with the capacity to pump at 8,000 gpm each (32,000 gmp collectively), flow rate projected for a 100-year event could be pumped to the clarification basin. Modeling indicates that retention times of from 12 to 50 minutes would be achieved under this scenario. A portion of the modeling results are below the general design guideline of 30 minutes retention time, however, jar testing performed with various coagulants indicated that settling would likely occur in less than 5 minutes.

9.3 LONG-TERM MANAGEMENT/MONITORING

Because Northern Outfall 003 remains a discharge point under EOS’s stormwater NPDES 1200-Z permit EOS will continue to monitor at that outfall four times per year for monitoring parameters specified in the permit. However, some initial monitoring and the ongoing monitoring of additional parameters are required to ensure the system is effective at controlling stormwater contaminant sources. EOS conducted pilot testing of the system after the northern drainage basin was connected to the end-of-pipe treatment in 2007. Some modifications to the system were made and the central drainage basin was connected at the end of 2008 followed by another round of pilot testing. Pilot tests involved collecting stormwater samples at facility locations prior to the clarification basin and at the Northern Outfall 003. Seven storm events meeting the following criteria specified in the *Framework for Portland Harbor Storm Water Screening Evaluations* (DEQ Dec 2005) were monitored over the two-year period:

- Antecedent dry period of at least 24 hours,
- Minimum predicted rainfall volume of > 0.2 inches per event, and
- Expected duration of storm event of at least 3 hours.

Samples were analyzed for TSS, PCBs, metals, and PAHs. Data indicated order of magnitude reductions in TSS levels from those measured pre-treatment system. With the exception of cadmium, copper, lead, zinc, and total PCBs; all contaminants were below JSCS SLVs for stormwater at the discharge point. Cadmium, copper, lead, and zinc exceedances were less than an order of magnitude. While the total PCBs concentration exceeded the bioaccumulative SLV, concentrations of individual Aroclors were below the corresponding toxicity SLVs.

EOS is in the process of conducting a comprehensive stormwater loading evaluation for its facility in the 2010/2011 water year. The loading evaluation will include the following:

1. Stormwater grab samples from four storm events at the Rivergate Outfall 002 analyzed for organic compounds and metals.
2. Flow-weighted composite whole water stormwater samples from three storm events at the Northern Outfall 003 analyzed for organic compounds and metals.
3. Dry weather grab samples from three sample events at the Northern Outfall 003 analyzed for organic compounds and metals.

Data generated from this study will be used to assess contaminant loading to the Willamette River from stormwater discharge at the facility and provide the basis for determining the need, if any, for further action to address source control for stormwater at the site, aside from the long-term management and monitoring that will continue under EOS's 1200-Z stormwater NPDES.

10. ADMINSTRATIVE RECORD INDEX

The Administrative Record consists of the documents on which the proposed source control measures for the site are based. The primary documents used in evaluating source control alternatives for stormwater at the EOS site are listed below. Additional background and supporting information can be found in the EOS project file located at DEQ Northwest Region Office, 2020 SW 4th Ave., Portland, Oregon.

SITE-SPECIFIC DOCUMENTS

AECOM 2009b. Stormwater Loading Work Plan, prepared for Evraz Oregon Steel Portland, October 2009.

AECOM 2009c. Stormwater Loading Work Plan Addendum, prepared for Evraz Oregon Steel Mill, Portland, AECOM Environment, October 26, 2009.

AECOM 2009a. Phase Two Pilot Study Report for End-of Pipe Stormwater Treatment Central (001) and Northern (003) Outfalls, prepared for Evraz Oregon Steel, Portland Oregon, August 2009.

AECOM, 2010. Draft Evraz Oregon Steel Upland Human Health Risk Assessment Work Plan, Evraz Oregon Steel Mill, Portland, Oregon, AECOM Environment, February 12, 2010.

Anchor & Integral, 2008. Portland Harbor RI/FS. Round 3A & 3B Stormwater Data Report. Prepared for the Lower Willamette Group. Anchor Environmental, L.L.C. and Integral Consulting, Inc. September 2008.

ENSR/AECOM 2008. Phase Two Pilot Study Work Plan for End-of-Pipe Stormwater Treatment, prepared for Evraz Oregon Steel Portland, October 2008.

Evraz Inc. 2009. Stormwater Pollution Control Plan, General Permit 1200Z, File No. 64905. May 2009.

Exponent, 2001. Pre-Remedial Field Activities Data Report, Oregon Steel Mills Inc., Portland, Oregon. February 2001.

Exponent, 2002. Pre-Remedial Investigation Assessment Report, Oregon Steel Mills Inc., Portland, Oregon. January 2002.

Exponent, 2004a. Phase I Remedial Investigation Report, Oregon Steel Mills Inc., Portland, Oregon. Exponent, March 2004.

Exponent, 2004b. Phase IIA Remedial Investigation Soil and Slag Soil-Fill Sampling Data Report, Oregon Steel Mills Inc., Portland, Oregon. June 2004.

Hart Crowser, 1994. Scrap Yard Assessment report, Oregon Steel Mills, Portland, Oregon. Prepared for Heller, Ehrman, White and McAuliffe. Dated December 13, 1994. (DEQ00114050DEQ001144). Hart Crowser, Inc. Portland, Oregon.

Oregon Department of Environmental Quality-Oregon Steel Mills Inc., 2000, Voluntary Agreement for Remedial Investigation and Source Control Measures. DEQ No. WPMVC-NWR-00-10.

Parsons, 2007. Results of Columbia Slough Porewater Survey, Former UCC/Elkem Site, Portland, OR. January 2007.

RETEC, 2006a. Coating Mill Baseline Soil and Groundwater Sampling Results Letter, Oregon Steel Mills, Inc., Portland Oregon Mill, The RETEC Group, Inc., July 7, 2006.

RETEC, 2006b. Source Control Evaluation of Stormwater, Oregon Steel Mills, Inc., Portland Oregon Mill, August, 2006.

RETEC, 2006c. Mosely Shear Hot Spot Removal Completion Report, Oregon Steel Mills, Inc., Portland Oregon Mill, The RETEC Group, Incl, September 20, 2006

RETEC 2007a. Pilot Study Work Plan for End-of Pipe Stormwater Treatment Outfall 003, prepared for Evraz, Oregon Steel Portland, February 2007.

RETEC, 2007b, Landfill Construction Report, Oregon Steel Mills Inc., Portland, Oregon. Mill, The RETEC Group, Inc., May 2007.

STATE OF OREGON

Oregon's Environmental Cleanup Laws, Oregon Revised Statutes 465.200-.900, as amended by the Oregon Legislature in 1995.

Oregon's Hazardous Substance Remedial Action Rules, Oregon Administrative Rules, Chapter 340, Division 122, adopted by the Environmental Quality Commission in 1997.

GUIDANCE AND TECHNICAL INFORMATION

DEQ. Guidance for Evaluating the Stormwater pathway at Upland Sites. November 2009.

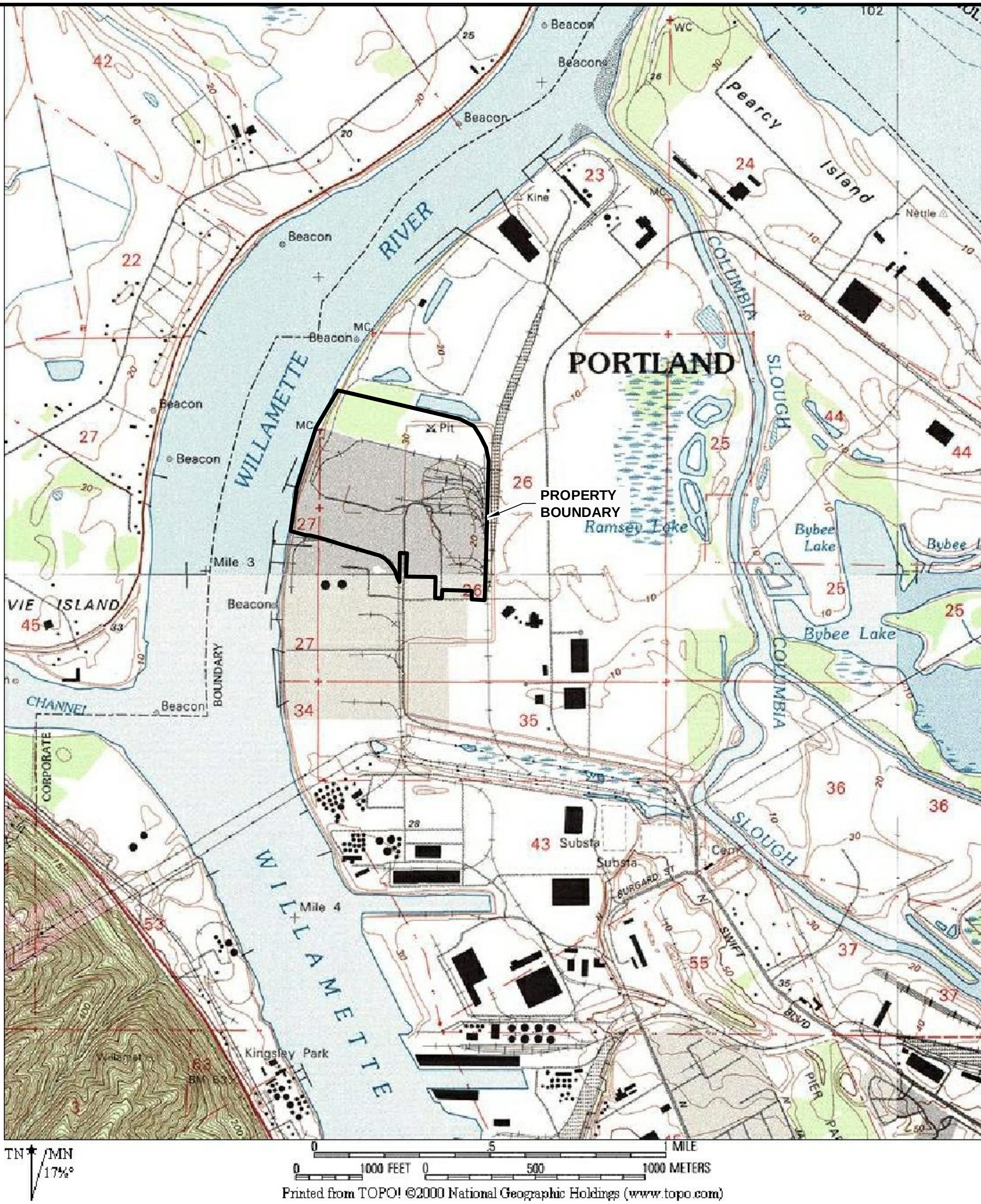
DEQ-U.S. Environmental Protection Agency, Portland Harbor Joint Source Control Strategy, December 2005.

DEQ. 2003. Risk-based decision making for the remediation of petroleum-contamianted sites. September 22, 2003.

DEQ. Guidance for Conducting Feasibility Studies. July 1998.

DEQ. Guidance for Identification of Hot Spots. April 1998.

USEPA. Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA. Office of Emergency and Remedial Response. OSWER Directive 9355.3-01. October 1988.



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AECOM

EVRAZ OREGON STEEL MILLS PORTLAND, OREGON 60150686-203	VICINITY MAP
DATE: 4/13/10 · DRWN: E.M./SEA	FIGURE 1

File: M:\Evraz OSM\Stormwater Source Control Proposal\vicinity map.dwg Layout: FIGURE 1 User: marshalle Plotted: Apr 13, 2010 – 7:57am Xref's:

EVRAZ OREGON STEEL MILLS
PORTLAND, OREGON

60150686-203

DATE: 4/13/10 DRWN: E.M./SEA

SITE PLAN

FIGURE 2

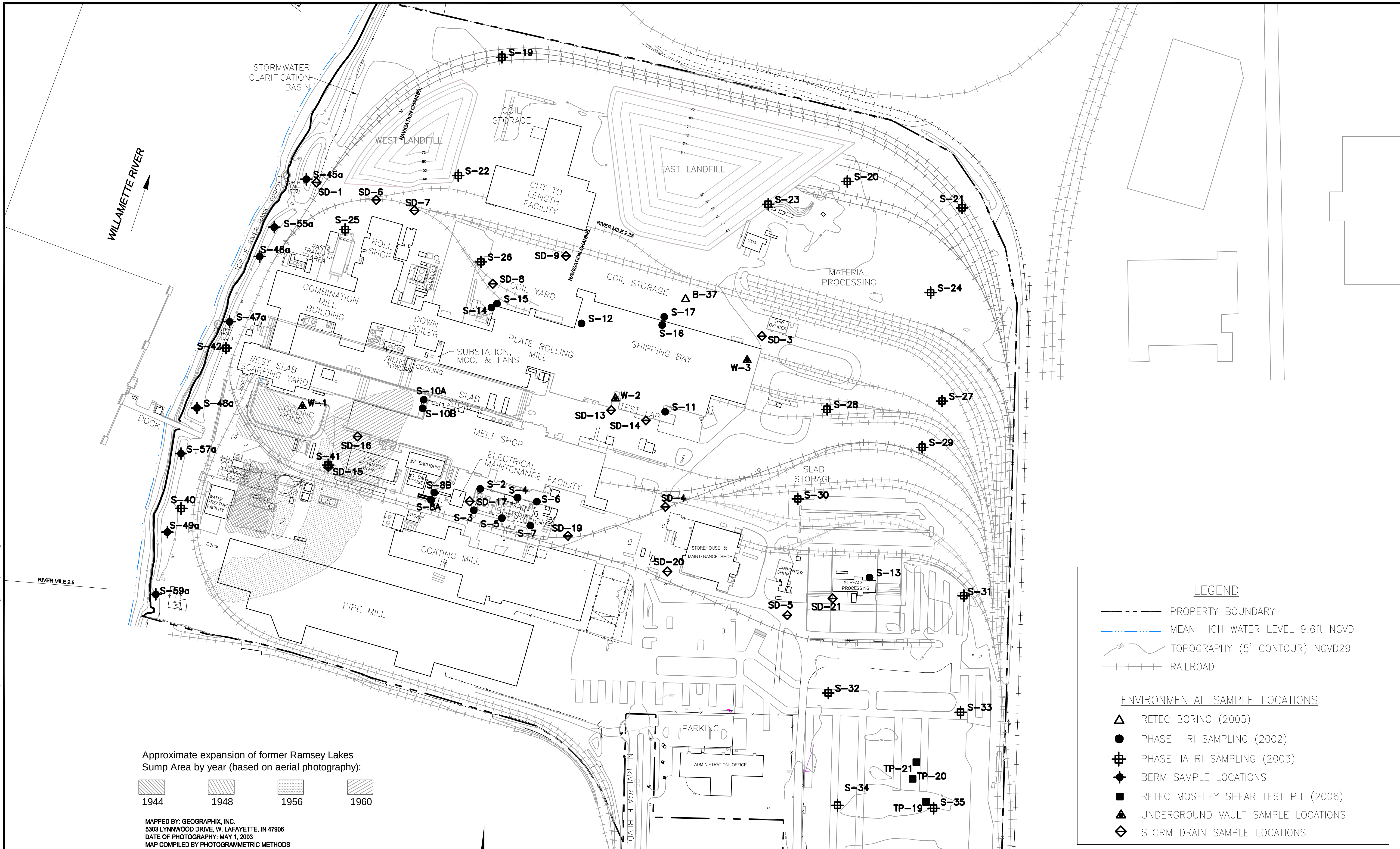
EVRAZ OREGON STEEL MILLS
PORTLAND, OREGON

60150686-203

DATE: 4/13/10 | DRWN: E.M./SEA

STORMWATER BASIN LAYOUT

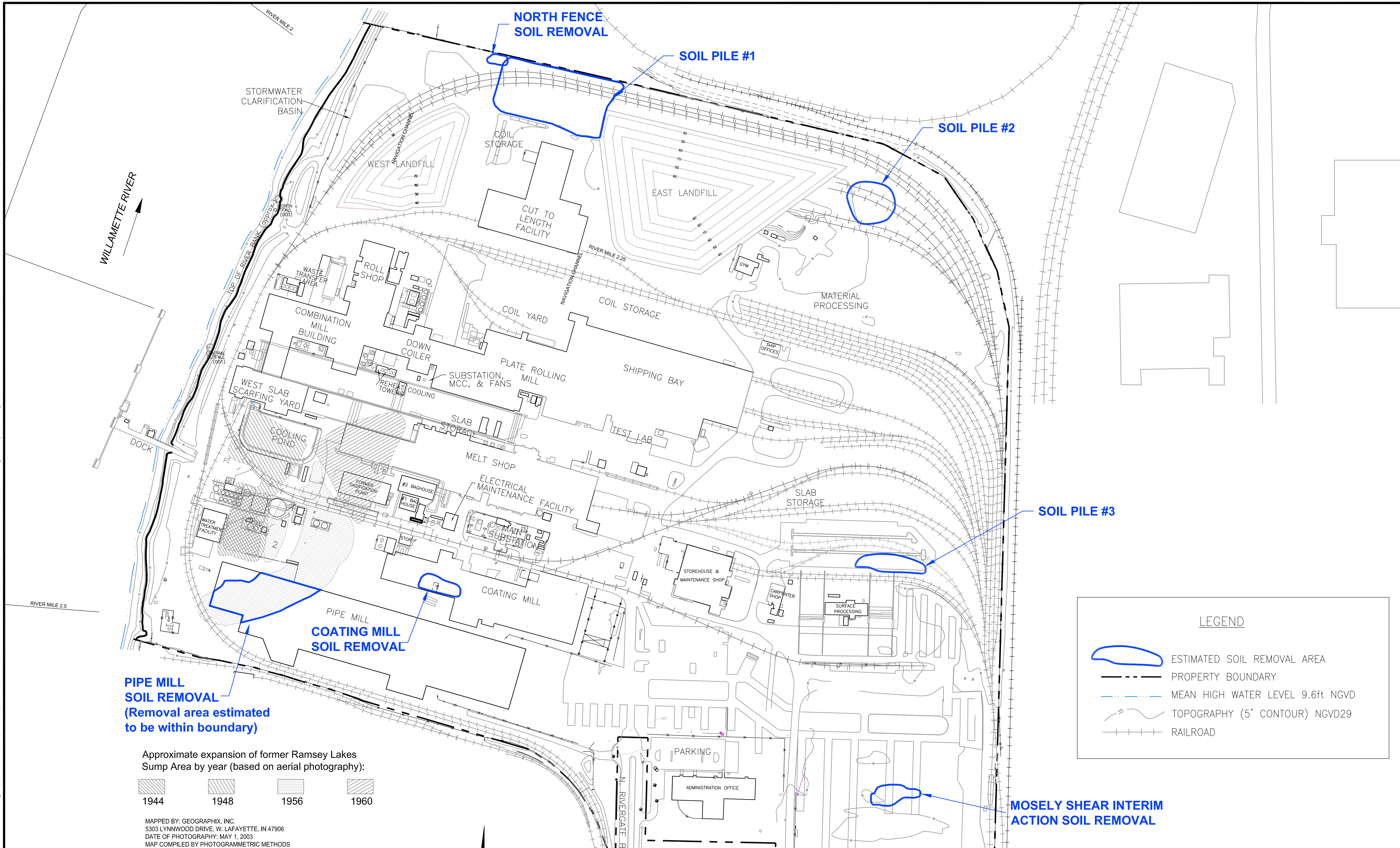
FIGURE 3



File: M:\Evraz OSM\Stormwater Source Control Proposal\sample locations.dwg Layout: figure 4 User: marshalle Plotted: Apr 13, 2010 – 7:59am Xref's:

AECOM

EVRAZ OREGON STEEL MILLS PORTLAND, OREGON 60150686-203	**SURFACE SOIL AND CATCH BASIN SAMPLE LOCATIONS**
DATE: 4/8/10 — DRWN: E.M./SEA	**FIGURE 4**



AECOM

EVRAZ OREGON STEEL MILLS
PORTLAND, OREGON
60150686-203

DATE: 4/13/10 DRWN: E.M./SEA

SOIL REMOVAL AREAS

FIGURE 5

AECOM

EVRAZ OREGON STEEL MILL
PORTLAND, OREGON
60150686-203

DATE: 4/12/10 | DRWN: E.M./SEA

STORMWATER END-OF-PIPE TREATMENT SYSTEM LAYOUT

FIGURE 6

Table 1 Summary of Surface Soil (0-3 feet bgs) Results - Contaminants of Potential Concern

Chemical Name	Unit	PHSL (toxicity)	PHSL (bio-accumulation)	Sample Type Action Level Unit	Summary Statistics Samples	Detects	Non-Detects	Exceedances	Max Detected Concentration	Max Concentration Location	Average Det Concentration
Metals											
Chromium	mg/Kg	111		mg/kg	4	4	0	2	335	S-57a	130.025
Manganese	mg/Kg	1100		mg/kg	4	4	0	2	3090	S-57a	1336.750
Arsenic	mg/Kg	33	7	mg/kg	4	4	0	1	9.49	S-57a	6.530
Cadmium	mg/Kg	4.98	1	mg/kg	4	2	2	1	1.06	S-57a	0.770
Copper	mg/Kg	149		mg/kg	4	4	0	0	130	S-57a	48.950
Lead	mg/Kg	128	17	mg/kg	4	4	0	1	33.7	S-59a	15.255
Zinc	mg/Kg	459		mg/kg	4	4	0	0	192	S-59a	102.425
PCBs											
Aroclor 1016	mg/kg	.53		mg/kg	48	0	48	0	-	-	-
Aroclor 1221	mg/kg				48	0	48	0	-	-	-
Aroclor 1232	mg/kg				48	0	48	0	-	-	-
Aroclor 1242	mg/kg				48	0	48	0	-	-	-
Aroclor 1248	mg/kg	1.5		mg/kg	48	21	27	2	3.6	S-29	0.471
Aroclor 1254	mg/kg	.3		mg/kg	48	14	34	5	2.8	S-2	0.493
Aroclor 1260	mg/kg	.2		mg/kg	48	23	25	10	430	S-2	19.090
Total PCB (Calculated) 1	mg/kg	.676	.00039	mg/kg	48	41	7	41	430	S-2	11.118
PAHs											
2-Methylnaphthalene	mg/kg	.2		mg/kg	5	2	3	0	0.11	S-16	0.079
Acenaphthene	mg/kg	.3		mg/kg	5	2	3	0	0.074	S-16	0.042
Acenaphthylene	mg/kg	.2		mg/kg	5	1	4	0	0.023	B-37	0.023
Anthracene	mg/kg	.845		mg/kg	5	1	4	0	0.023	B-37	0.023
Benzo(a)anthracene	mg/kg	1.05		mg/kg	5	3	2	0	0.07	B-37	0.038
Benzo(a)pyrene	mg/kg	1.45		mg/kg	5	2	3	0	0.15	B-37	0.096
Benzo(b)fluoranthene	mg/kg				5	3	2	0	0.1	B-37	0.059
Benzo(g,h,i)perylene	mg/kg	.3		mg/kg	1	1	0	0	0.2	B-37	0.200
Benzo(k)fluoranthene	mg/kg	13		mg/kg	5	2	3	0	0.095	B-37	0.072
Chrysene	mg/kg	1.29		mg/kg	5	3	2	0	0.11	B-37	0.057
Dibenz(a,h)anthracene	mg/kg	1.3		mg/kg	5	1	4	0	0.019	B-37	0.019
Dibenzofuran	mg/kg				1	1	0	0	0.0054	B-37	0.005
Fluoranthene	mg/kg	2.23	37	mg/kg	5	5	0	0	0.26	S-16	0.080
Fluorene	mg/kg	.536		mg/kg	5	1	4	0	0.0085	B-37	0.009
Indeno(1,2,3-cd)pyrene	mg/kg	.1		mg/kg	5	2	3	1	0.15	B-37	0.103
Naphthalene	mg/kg	.561		mg/kg	5	2	3	0	0.17	S-16	0.134
Phenanthrene	mg/kg	1.17		mg/kg	5	3	2	0	0.23	S-16	0.116
Pyrene	mg/kg	1.52	1.9	mg/kg	5	3	2	0	0.14	B-37	0.063
NWTPH-Dx											
Diesel Range B	mg/kg				17	17	0	0	7000	S-16	487.188
Residual Range C	mg/kg				17	17	0	0	24000	S-16	1734.294
Diesel Range Hydrocarbons	mg/Kg				1	1	0	0	430	TP19	430.000
Residual Range Organics (RR	mg/Kg				1	1	0	0	1200	TP195	1200.000

Table 2 Summary of Catch Basin Results

Chemical Name	Unit	PHSL (toxicity)	PHSL (bio-accumulation)	Action Level unit	Summary Statistics Samples	Detects	Exceedances	Max Detected Concentration	Max Concentration Location	Average Det Concentration
Metals										
Arsenic	mg/kg	33	7	mg/kg	18	18	4	12	SD-8	5.588
Cadmium	mg/kg	4.98	1	mg/kg	18	13	10	14	SD-16	2.931
Chromium	mg/kg	111		mg/kg	18	18	18	7000	SD-7	2194.706
Copper	mg/kg	149		mg/kg	18	18	11	460	SD-16	208.412
Lead	mg/kg	128	17	mg/kg	18	18	16	670	SD-16	132.529
Manganese	mg/kg	1100		mg/kg	18	18	18	68000	SD-7	19300.000
Mercury	mg/kg	1.06	0.07		18	18	0	0.17	SD-5	0.078
Nickel	mg/kg	48.6			18	18	0	170	SD-16	69.778
Zinc	mg/kg	459		mg/kg	18	18	9	2400	SD-16	850.556
PCBs										
Aroclor 1016	mg/kg	.53		mg/kg	16	0	0	-	-	-
Aroclor 1221	mg/kg				16	0	0	-	-	-
Aroclor 1232	mg/kg				16	0	0	-	-	-
Aroclor 1242	mg/kg				16	0	0	-	-	-
Aroclor 1248	mg/kg	1.5		mg/kg	16	8	0	1.5	SD-1	0.677
Aroclor 1254	mg/kg	.3		mg/kg	16	10	2	0.63	SD-1	0.187
Aroclor 1260	mg/kg	.2		mg/kg	16	0	0	-	-	-
Total PCB (Calculated)	mg/kg	.676	.00039	mg/kg	16	16	16	2.13	SD-1	0.455
PAHs										
2-Methylnaphthalene	mg/kg	.2		mg/kg	17	9	0	0.19	SD-5	0.084
Acenaphthene	mg/kg	.3		mg/kg	17	6	0	0.11	SD-3	0.074
Acenaphthylene	mg/kg	.2		mg/kg	17	0	0	-	-	-
Anthracene	mg/kg	.845		mg/kg	17	10	0	0.22	SD-5	0.077
Benzo(a)anthracene	mg/kg	1.05		mg/kg	17	14	0	0.58	SD-5	0.152
Benzo(a)pyrene	mg/kg	1.45		mg/kg	17	12	0	0.37	SD-5	0.150
Benzo(b)fluoranthene	mg/kg				17	14	0	1	SD-5	0.252
Benzo(g,h,i)perylene	mg/kg	.3		mg/kg	17	13	1	0.55	SD-5	0.191
Benzo(k)fluoranthene	mg/kg	13		mg/kg	17	12	0	0.54	SD-5	0.153
Chrysene	mg/kg	1.29		mg/kg	17	16	1	1.3	SD-5	0.274
Dibenz(a,h)anthracene	mg/kg	1.3		mg/kg	17	4	0	0.076	SD-20	0.060
Fluoranthene	mg/kg	2.23	37	mg/kg	17	16	0	1.5	SD-5	0.319
Fluorene	mg/kg	.536		mg/kg	17	8	0	0.11	SD-5	0.069
Indeno(1,2,3-cd)pyrene	mg/kg	.1		mg/kg	17	7	5	0.23	SD-3	0.155
Naphthalene	mg/kg	.561		mg/kg	17	9	0	0.2	SD-5	0.112
Phenanthrene	mg/kg	1.17		mg/kg	17	16	0	0.99	SD-5	0.237
Pyrene	mg/kg	1.52	1.9	mg/kg	17	16	1	2.2	SD-5	0.462
NWTPH-DX										
Diesel Range B	mg/kg				18	18	0	1500	SD-16	365.772
Residual Range C	mg/kg				18	18	0	7900	SD-16	2207.611

Total PCBs equal to sum of detected PCB aroclor values or the highest method reporting limit if all PCB aroclors are non-detect

Table 3 Stormwater Comparison

	PH Stormwater**	
Compound	Average***	Stormwater (ug/L)
		Pilot test data
	Pre-pilot 3/07 to 5/07	Spring 2009 Averages
2-Methylnaphthalene	0.035	ND
Acenaphthene	0.041	0.027
Acenaphthylene	0.007825	ND
Aluminum		
Anthracene		0.012
Antimony		
Arochlor 1248		0.0104
Arochlor 1254		0.0056
Arsenic	4.965	
Benzo(a)anthracene	0.03525	
Benzo(a)pyrene	0.022	
Benzo(b)fluoranthene	0.048	
Benzo(g,h,i)perylene	0.03175	
Benzo(k)fluoranthene	0.0135	
Bis(2-ethylhexyl) phthalate	1.345	ND
Butylbenzyl phthalate	0.5525	
Cadmium	1	0.166
Chromium	99.6	31.2
Chrysene	0.0595	0.014
Copper	35.05	5.63
Dibutyl phthalate		ND
Diethyl phthalate		0.18
Dimethyl phthalate		ND
Di-n-octyl phthalate		ND
Fluoranthene	0.1525	0.06
Fluorene	0.0315	0.012
Indeno(1,2,3-cd)pyrene		ND
Lead	47.6	3.8
MCPA	17.875	
MCPP	16.775	
Naphthalene	0.08075	0.024
Nickel	11.8	3.81
PCB Congener sum	0.279	
Phenanthrene	0.12225	0.052
Pyrene	0.1545	0.053
Zinc	108.95	39

* PH Stormwater data summary Central OF (001)

** Metals are total

TSS 1996 - 2007	TSS 2009 average
186 - 216 mg/L	31.9 mg/L